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ABSTRACT

A media attribute approach was used in a study which hypothesized that compositional syntactic placement may bridge the processing link between the learner's cognitive capacity and the demands of a simple concept attainment task. Compositional syntactic placement refers to the relative horizontal position of the primary symbol or object within a frame (left, central, or right) in relation to other study elements. The experiment questioned whether a particular horizontal frame position was warranted in relation to predictive ability and field dependence/independence. Compositional syntactic placement was manipulated by producing three versions of a videotaped program that were identical, with the exception of 10 visual test stimuli. The 9-minute program, which was entitled "Obstacles to Career Growth--Sex Roles," contained 10 simple concepts on sex role indicators. Subjects were 152 women (ages 19 to 72) who attended a nonformal workshop conducted in the central Georgia area on "Sex Roles and How to Get Out of Them." Results indicated that composition syntactic placement significantly increased simple concept learning, and aptitude-treatment interactions were observed. Forty-one references are listed. (Author/LMM)

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Compositional Syntactic Placement and Simple Concept Learning In Female Adults

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ABSTRACT

The media attribute approach of this study hypothesized that compositional syntactic placement may serve to bridge the processing link between the learner's cognitive capacity and the demands of a simple concept attainment task. Specifically, this exploratory experiment was questioning whether a particular horizontal frame position was warranted in relation to two selected cognitive abilities: predictive ability and field articulation. Compositional syntactic placement was manipulated by producing three versions of a videotaped program that were identical in every respect with the exception of ten visual test stimuli. A nonequivalent-control group, treatment-by-blocks design was employed. Analysis of variance and multiple comparison techniques conducted on pretest-posttest difference scores indicated compositional syntactic placement increased very significantly simple concept learning, and aptitude-treatment interactions were observed. The conclusion of the study recommends further experimental research be conducted on the media attribute theory with an aptitude network approach.

Compositional Syntactic Placement and

Simple Concept Learning In Female Adults

The purpose of this exploratory inquiry was to investigate the media attribute, compositional syntactic placement, for potential aptitude-treatment intersections. Media attributes are one of the three predominant theories which have evolved in the last decade (Jurkelson, 1984). Goodman's (1968) symbol system theory, Olson's (1976) theory of instructional means, and Salomon's (1979) media attribute theory have been succinctly summarized and analyzed by Snow and Salomon (in press) for the Third Handbook of Research on Teaching. All three theories have one implicit tenet in common: the need to examine the effects of selected media attributes on the internal cognitive processes of the learner.

Many symbol systems within media have the potential to facilitate or debilitate learning by calling upon different processing strategies (Bovy, 1981; Gagné, 1980). Some coding elements can save mental activity and thus ease the processing burden on unskilled learners; however, skilled learners, on the other hand, may show a decrement in cognitive processing under the same conditions (Cronbach & Snow, 1977). Those coding elements or media attributes which have the potential to affect cognitive processing may be identified by following Goodman (1968). Film and television entail a number of levels of articulation--the shot, the sequence, the syntagm, the whole program. Each of these requires its own rules and conventions of articulation that pertain to the transformation and composition of events, objects, and relations over time and space. These syntactic modes need not be the same for all levels of articulation. The way a single shot is composed differs from the way a whole sequence of shots is composed--e.g., high or low frame placement to indicate importance; left or right frame placement to indicate pre-

dominance; parallel sequences to show comparison or contrast; parenthetical sequences to show different aspects of the same situation; and so on (Kjørup, 1977; Mascelli, 1965; Metz, 1974).

Compositional Syntactic Placement

Recognizing that there are numerous media attributes, this study focused on one coding system element, compositional syntactic placement. Compositional syntactic placement may be conceptualized as the relative horizontal position of the primary symbol or object within the frame-- left, central, or right-- in relation to other secondary elements (Dondis, 1973; Zettl, 1973). Art historian Hienrich Wölfflins in his article "Uber das Rechts und Links im Blide" in 1928 (cited in Arnheim, 1954) was the first to call attention to the fact that pictures change appearance and lose meaning when turned into their mirror images. From his observations, he concluded that there is a general tendency for the eye to follow a path which begins at the left side of the picture and ends at the right. Wölfflins was able to describe the left-right phenomenon, but he was not able to explain it: "Apparently it has deep roots, roots that reach down to the nethermost foundations of our sensuous nature (p. 19)." Except for a few experiments with inconclusive results, scientific study regarding left, central, or right placement within visual media has been largely ignored (Metallinos, 1979).

None of the research to date has shown any cogently significant difference on aesthetic or learning variables in the placement of elements within the frame (e.g., Avery & Tiemens, 1975; Fletcher, 1977, 1980; Herbener, Van Tubergen & Whitlow, 1979). One study by Metallinos (1980) reported significant differences in that subjects were able to describe

the shape ($p<.01$), to perceive color ($p<.001$), and to recall ($p<.02$) visual stimuli placed on the left side of the screen better than those placed on the right. Of those studies reporting trends, Metallinos (1975) and Metallinos and Tiemens (1977) reported that retention of visual (but not verbal) information in a newscast was enhanced by placement on the left side of the screen, while Niekamp (1981) reported that mean fixations of test stimuli measured by ocular photography favored the right. Hence, limited support favored the left orientation in dual comparisons (left vs. right placement), but a more accurate method of measurement indicated the right orientation. With the exception of the Metallinos and Metallinos-Tiemens studies, none of the experiments attempted to evaluate learning effects, and these researchers reported no significant difference. In summarizing the current state of knowledge, Niekamp (1981, p. 147) stated that the data "merely reflect the conflicting views and uncertain results found in the theoretical research literature . . . [and] . . . that these [left-right] differences may be a function of and are affected by individual human differences."

Cognitive Abilities

In regard to the cognitive abilities alluded to by Niekamp and Wolfflins, Snow and Salomon (1968) as well as others (Clark, 1975; Levie & Dickie, 1973; Salomon & Clark, 1977; Snow, 1970) have pointed out that individual aptitudes in the areas of intellectual abilities, cognitive styles and preferences, learning sets, information processing and coding strategies, and other subtle experimental variables are likely to interact in many complex ways with the instructional design variables of visual stimuli. Some evidence exists that two variables may have the potential

to affect simple concept learning from a media attribute: field articulation and predictive ability.

Field Articulation. Gagné (1977) has specified that discrimination and generalization skills are basic to all concept learning. He noted that the learner must first distinguish relevant details (discriminate), then further organize this information as a basis for classifying new items as examples or nonexamples of a concept class (generalize). Learners appear to differ in their ability to discriminate and generalize, and the cognitive style construct, field articulation (field independence vs. field dependence), has been related empirically to these differences (Witkin, Oltman, Raskin & Karp, 1971). Previous research indicates that concept attainment tasks are often more demanding for field-dependent individuals (Dickstein, 1968; Kirschenbaum, 1968; Witkin, Moore, Goodenough & Cox, 1977). Individuals who are perceptually field-dependent have been found to experience their world in a less differentiated fashion when dealing with perceptual cognitive tasks (Witkin & Goodenough, 1976; Witkin, Goodenough & Oltman, 1977); that is, field-dependent persons tend to accept the visual field passively as presented and ignore important details which presumably are not salient to them. Furthermore, they appear to be dominated by the most salient or noticeable parts of a visual (Dickstein, 1968; Kirschenbaum, 1968). Their tendency to display less differentiated functioning is evident also in the processing strategies they use when directed to form a concept hypothesis. Their hypothesis-testing strategy has been associated with a partist approach which lacks organization (Goodenough, 1976; Kirschenbaum, 1968). Field-dependent learners may be handicapped by unstructured materials and a lack of

salient details upon which to base their hypothesis. The difficulty of field-dependent learners may be particularly apparent when instructional time is limited by a fixed-paced presentation. Pishkin (1965) has suggested that specification of concept attributes, in some manner, may reduce learning difficulty for field-dependent individuals by reducing the number of hypotheses to be considered.

The field-dependent strategy may be contrasted with that of the field-dependent learners. These learners are capable of more differentiated functioning; that is, they are capable of using their restructuring skills as internal mediational processes (Witkin, Moore, Goodenough & Cox, 1977). Their hypothesis-testing strategies have been associated with a wholist approach which imposes organization (Goodenough, 1976; Kirschenbaum, 1968). Frederick (1968) has noted that only the more analytic learners are sensitive to amounts of relevant information. The field-independent learner tends to scan the first positive concept example and to retain all its attributes for later comparison with those in subsequent examples. If a hypothesis is proven to be inappropriate, then a revised hypothesis is formed. The wholist strategy of hypothsis testing is more active than the partist approach and has resulted in better learning performance particularly when subjects were under time pressure (Bruner, Goodnow & Austin, 1956; Bourne, 1966). In his discussion of hypothesis-testing strategies, Mayer (1977) pointed out that the superiority of the wholist strategy could be due to its reduced demand on memory, because the wholist is able to eliminate those attributes which fail to reappear.

Predictive Ability. The Predictive Ability Test was developed in the context of a theory of behavior which proposes that general ability can be estimated by the measurement of predictive ability (Friedman, 1974, 1975; Friedman & Willis, 1981). General ability (G) is a complex measure. The hierarchical model of ability organization, as interpreted by Cattell (1971), has at its highest level a distinction between fluid-analytic intelligence (G_f) and crystallized-verbal intelligence (G_c). After decades of factor analytic debate, this or related hierarchical views have finally become popular because they fit existing data rather well while offering some hope of parsimony (Snow, 1977, 1980). Horn (1976) summarized much recent correlational research under these rubrics, adding spatial visualization ability (G_v) to the general level. Cronbach and Snow (1977) adopted such a hierarchical view in attempting to make sense of a large number of studies which were designed to take into account learner aptitudes that might interact with media and task characteristics.

The Cronbach-Snow review noted that G has been the most widely studied aptitude construct in instructional media research and has produced the most aptitude-treatment interaction. The general hypothesis from the review is that as learners are required to organize their own study and build their own comprehension, the more able learners are capable of capitalizing on their strengths profitably. As instructional treatments were arranged to relieve learners from difficult reading, analyzing complex concepts and building their own cognitive structures, such treatments seemed to compensate for, or circumvent, less able learners' weaknesses and to reduce the regression slope of G. Some kinds of treatment-

supplied cognitive models have actually interferred with the performance of high G students in instructional media research (e.g., Salomon, 1968, 1979). A "Zoom Film" reported by Salomon (1974) overtly supplanted the process of relating parts to wholes and thus facilitated learning for those subjects who could not easily execute that process on their own. However, the same supplanting element debilitated learning of better-skilled subjects apparently by interferring with their depth of processing. Also included in a second experiment of the study was an evaluation of field articulation (a measure of the fluid analytic (G_f) and spatial visualization (G_v) cluster of abilities according to Snow, 1977, 1980), resulting in the same aptitude-treatment interaction.

Considering the above selected cognitive abilities, the query of this research was to determine whether compositional syntactic placement was effective in improving simple concept learning from audiovisual media. This researcher was asking whether, under the impact of different learner attributes, a particular frame position was warranted. Performance by female subjects at different levels of these cognitive abilities was investigated with an instrument which sought to isolate simple concept learning derived from an instructional television program on women's sex-roles produced in three compositional styles specifically for this study.

METHOD

Subjects

Female adults were chosen as the subjects, since women account for upwards to 75 percent of the participants in telecourse-centered and distance learning programs (Bryan & Forman, 1977; Zigerall, 1976).

Attendees to a nonformal workshop, "Sex Roles and How to Get Out of Them," conducted in the central Georgia area served as voluntary subjects. A total of 152 women completed all portions of the experiment. Age ranged from 19 to 72 years (M = 38.96, SD = 10.34), and the educational level attained ranged from 10 to 19 years (M = 14.04, SD = 2.05). None of the subjects were full-time students.

Materials

Stimuli. A nine-minute videotaped program entitled, "Obstacles to Career Growth--Sex Roles," was designed specifically for this experiment. The program contained ten simple concepts on sex role indicators which formed the basis for a stimuli set and for test questions. Each stimulus was constructed in three versions for left, right, and central syntactic placement by a graphic artist who controlled symbol size, color, and background. Three experimental tapes were carefully constructed with an electronic editor to ensure that each test stimulus was exactly the same length in all versions. The ten test stimuli embedded within the program were exposed on the screen from 7.66 to 13.60 seconds (M = 10.7[illegible]). Thus, the only difference between the left, right, and central versions of the experimental videotape was the composition of the test stimuli set.

The Criterion Tests. Two multiple-choice questions with five options were constructed for each of the ten sex role indicator concepts within the videotaped program. Two additional questions were added to insure comprehension of concepts that may have been confused with definitions derived from common usage. To determine if any life-history events might have altered significantly the characteristics of the groups, true-false questions on reading sex role material and on a personal

encounter with a sex typing situation were included on the pretest. In order to reduce the length of the 22-item questionnaire to four pages, a modified matching format was utilized for the first twelve questions, since they involved definitions of concepts and attributes. The final reliability of the pretest-posttest criterion instruments determined during a pilot study was .76 as measured with the Kuder-Richardson Formula 20.

Predictive Ability Test (PAT). The PAT was developed in response to mounting criticism of intelligence tests in the early 1970's resulting from, (a) the lack of a definition and theory of intelligence, (b) cultural bias, (c) the similarity of intelligence test to achievement tests, and (d) the reliance of intelligence tests on verbal ability (Friedman, 1974). Predictive ability is a measure of general intelligence ability based upon the individual's aptitude to make prediction about events (Friedman, 1975; Friedman & Willis, 1981). This definition is based upon expectancy learning theory which defines learning in terms of the organism's ability to interact with the environment. While there is relatively little agreement on a definition, it should be remembered that some very old definitions of intelligence, from Binet on, include such phrases as "adaption to a goal," "capacity to reorganize behavior patterns for effective action," "maintenance of definite direction and concentration," "autocriticsm," and in sum, "ability to learn" (Snow, 1978).

The 30-item picture instrument requires the respondent to make predictions about events that are common to one's everyday experience, rather than about events which are generally learned in school. Sawyer

(1975) reported the test items have an average factor loading on the first principle axis (the predictive ability factor) of .49 with a range from .29 to .71. The proportion of common variance accounted for by the major factor in the unrotated solution (varimax rotation) was .47 with none of the other factors accounting for more than .09 of the variance. The PAT has a reliability of .90 as measured with the Kuder-Richardson 20 formula. The average difficulty index is .60 with a discrimination index of .53. During its standardization and initial study, the instrument correlated highly with different indexes of successful living--social adjustment, success in education, and job status. For the purpose of this exploratory study, the observed mean score on the PAT (19) was used to separate the subjects into two relative block groups: high or low ability.

Field Articulation. Field articulation is a cognitive style construct that is associated with competence at disembedding in perceptual and nonperceptual problem solving tasks (Messick, 1976). An individual who has difficulty disembedding simple figures from complex designs in the 18-item Group Embedded Figures Test (GEFT) is field dependent. A field dependent tends to be hindered in solving problems which require isolating an essential element from the context in which it is presented and using it in a different context. Individuals who do well on the GEFT are field independent and have the ability to delineate and structure perceptual and symbolic material (Witkin, Oltman, Raskin & Karp, 1971). Several studies have indicated that, although field-independent and field-dependent persons are not appreciably different in learning ability or memory, field-dependent persons tend to be better at learning

and remembering social material. Field-dependent individuals also are more likely to require externally defined goals and reinforcements than field-dependent individuals who tend to have self-defined goals and reinforcements (Goldstein & Blackmen, 1978; Witkin, Moore, Goodenough & Cox, 1977). Furthermore, field-independent people are less inclined to be influenced by the environment and perform well in circumstances where critical elements of a problem have to be taken out of context and restructured in a different way, such as mathematical reasoning, verbal fluency, and spatial abilities (Witkin, Moore, Oltman, Goodenough, Friedman, Owen & Raskin, 1977). For the purpose of this exploratory study, the observed mean score on the GEFT (8) was used to separate the subjects into two relative block groups: field-dependent and field-independent.

Apparatus

At the front of each classroom where the workshops were held, two Sony KV-1515 Trinitron color receivers with a 32 centimeter horizontal screen width were placed for optimal subject viewing. The test stimuli videotapes were played back on Sony VP-2000 U-matic videocassette players. Utilizing an internal radio frequency generator, the signal from the videocassette was delivered to each monitor by cable through an Archer two-way splitter and directional coupler (Catalog No. 15-1141B). Color bars, audio tone and a cross hatch pattern recorded from a Lenco PFM-300 signal generator on the beginning of each stimulus tape were utilized to ensure that every monitor reproduced the audio and video signals accurately. Horizontal and vertical picture deflections were adjusted by a television engineer prior to the experiment so there was less than five millimeters deviation for all monitors in the classrooms.

Procedure

The nonequivalent-control-group design was utilized (Campbell & Stanley, 1963). A total of six workshop sessions were conducted, and randomization of the treatment videotapes was employed. A double blind technique was applied to help reduce the effect of reactive arrangements. Subjects were unaware they were participating in an experiment until the conclusion of the workshop, and the workshop leaders as well as test administrators were unaware of which treatment was being administered. All workshop leaders had advanced degrees in counseling and guidance or clinical psychology, and all test administrators had formal instruction in testing and measurement. Three training sessions totaling over four hours were conducted for these six individuals prior to the workshop sessions.

Every workshop followed the same format. Participants were encouraged to seat themselves at the front of the classroom in order that (a) no one be farther away than 12 times the horizontal width of the television receiver screen, and (b) a line of vision of not more than 45 degrees from the center line axis perpendicular to the picture tube be maintained as a maximum viewing angle (Chapman, 1960). After an initial overview of the session by the trained female workshop leader, the pretest was administered and followed immediately by the syntactic visual treatment and then the posttest. This eliminated any incidental learning which might have been contributed by the discussion period which ensued. Subsequent to the discussion period and a short break, the PAT and GEFT were completed by the participants under the supervision of the trained female test administrator. In the final segment of the workshop, attendees

were informed that grouped scores would be used by the Center for Continuing Education of Women at Mercer University in developing future workshops and in a study on developing videotaped materials.

RESULTS

Group Equivalence

Since the experiment utilized six intact groups, two for each of the three treatments, equivalence of the three combined groups (n_{left}=50, n_{center}=52, n_{right}=50) was an important question to investigate prior to testing for the experimental hypothesis. A three level, one-way analysis of variance was used in analyzing the data between the groups for each subject background and aptitude variable: age, F (2,149) = .03, M = 38.96; educational level, F (2,149) = 1.30, M = 14.03; predictive ability, F (2,149) = 1.72, M = 18.49; field articulation, F (2,149) = .19, M = 8.47; pretest score, F (2,149) = 1.16, M = 9.99. The results showed no significant differences between the groups on any of the variables at the .05 level of significance.

To determine if the subjects had dissimilar life-history experiences which might have altered the equivalence of the groups, the two true-false questions on the pretest were analyzed using the independent samples Chi-Square Test. No significant differences were noted between the groups at the .05 level for subjects having read within the last month sex role materials, χ^2(2,N=152) = .19, or having had a recent encounter with a sex typing situation, χ^2(2,N=152) = .53. Most subjects responded in the negative to these two questions with 57.9% and 59.9%, respectively, circling false.

Analysis of Variance

A 3 X 2 X 2 unweighted means analysis of variance was conducted to test the major hypothesis of the study. The three independent variables were compositional syntactic placement, predictive ability, and field articulation. The dependent measure was pretest-posttest difference scores. Table 1 presents a summary of the analysis.

Insert Table 1 about here.

The analysis of variance resulted in a highly significant main effect for compositional syntactic placement, F (2,140) = 19.92, $p<.0001$. A significant main effect was also achieved for field articulation, F (1,140) = 6.23, $p<.05$, with field-independent subjects achieving higher mean difference scores (M = 5.31) than field-dependent subjects (M = 3.84). Two significant first-order interactions were observed as well, requiring caution in the interpretation of the main effects: placement by field articulation, F (2,140) = 3.56, $p<.05$, and ability by field articulation, F (1,140) = 9.76, $p<.01$. While not significant, the second-order interaction, placement by ability by field articulation, was at the α =.10 level, F (2,140) = 2.32.

Scheffé's (1953) S method was used to assess significant contrasts for the compositional syntactic placement main effect. Subjects who received the right syntactic treatment achieved a significantly greater mean difference score (M = 6.66) than either the left (M = 4.32, $p<.01$) or the central (M = 2.60, $p<001$) placement groups. Subjects who

received the left syntactic treatment also scored significantly higher than the central placement group ($p<.05$).

With two significant first-order interactions and a second-order interaction approaching significance, test of simple main effects were applied at all levels of one factor at each separate level of the other factor (Kirk, 1968) for intereactions involving compositional syntactic placement, field articulation, and ability (See Table 2).

Insert Table 2 about here.

The test of simple main effects revealed a significant interaction at less than .01 level for placement at field independence, F (2,140) = 16.92, and placement at field dependence F (2,140) = 8.11. Field articulation at right snytactic placement was also significant at less than the .01 level, F (1,140) = 13.09 (See Figure 1).

Insert Figure 1 about here.

Scheffé's S method applied to compositional syntactic placement at field independence (See Table 3) and compositional syntactic placement at field dependence (See Table 4) provided further information to aid in the understanding of the interaction.

Insert Table 3 and Table 4 about here.

Subjects in the field-independent, right stimulus group had a significantly higher mean difference score ($\underline{M}$ = 8.46) than those in the field-independent, central group ($\underline{M}$ = 3.26, $p<.001$) or those in the field-independent, left group ($\underline{M}$ = 4.05, $p<.001$). Similarly, subjects in the field-dependent right group had a significantly higher mean difference score ($\underline{M}$ = 5.00) than those in the field-dependent, central group ($\underline{M}$ = 1.88, $p<.01$); however, the mean difference score for the field-dependent, left group ($\underline{M}$ = 4.54) only approached significance from the field-dependent, central group. Thus, a disordinal interaction occurred for the left stimulus group. Field-dependent subjects had higher mean pretest-posttest difference scores than field-independent subjects in the left stimulus group, contrary to the other two groups where field-independent subjects scored higher.

The difference in gain scores was significant for high and low ability subjects when considering their field articulation. The test of simple main effects revealed a significant interaction at less than the .05 level for ability at field independence, $\underline{F}$ (1,140) = 6.62, and a significant interaction at less than the .01 level for field articulation at low ability, $\underline{F}$ (1,140) = 16.01 (See Figure 2). Low ability, field independent subjects had a significantly higher mean difference

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Insert Figure 2 about here.

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score ($\underline{M}$ = 6.18) than either their low ability, field-dependent counterparts ($\underline{M}$ = 3.06) or high ability, field-independent subjects ($\underline{M}$ = 4.40),

but they did not differ significantly from high ability, field-dependent subjects ($\underline{M}$ = 4.75).

Though not significant ($\underline{p}$ <.10), a graph of the placement by ability by field articulation interaction will ameliorate our understanding of the experimental variables effect (See Figure 3). For the low ability

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Insert Figure 3 about here.

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field-independent subject, these data showed that right syntactic placement was superior to the other two orientations. High ability, field-independent and high ability, field-dependent subjects also performed superiorly in the right syntactic placement group. The performance of the low ability, field-dependent subject was an entirely different matter. These subjects performed better in the left syntactic placement group. Notice that the graph represented in Figure 3 for the central and right syntactic groups mirrored the ability by field articulation interaction presented in Figure 2 (though at a wider angle), whereas the graph for the left syntactic placement group was exactly the 180 degree inverse of Figure 1. Unfortunately, this second order interaction only had limited support.

DISCUSSION

The syntactic placement of visual symbols within a videotaped presentation was shown to increase concept learning for female adults, regardless of whether the symbol was in the left or right orientation; however, the right syntactic placement was predominantly superior. This effect for placement was not to be expected based on previous research,

since six of the seven aesthetic studies reviewed dealing with syntactic placement found no significant difference. The one study (Metallinos, 1980) that reported significant differences found only that subjects were able to describe the shape and to recall the stimuli placed on the left side of the screen better than those placed on the right. While not significant, Niekamp (1981) had reported mean fixations of test stimuli measured by ocular photography favored the right. The disrepancy between these results and the previous studies may be attributed to the less distinctive visuals utilized in the experiments, such as the generic visuals of a newscast (e.g., themis for law stories, the caduceus for medical stories) or the more universal visuals of exploratory aesthetic research (e.g., circles, pastoral scenery). Metallinos (1975) and Metallinos and Tiemens (1977) noted this possibility as well.

Results from the pretest-posttest difference scores, confirmed that learners with field-dependent aptitudes have difficulty with externally-paced concept attainment tasks which require the ability to discriminate essential information (Dickstein, 1968; Kirschenbaum, 1968; Witkin, Moore, Goodenough & Cox, 1977). Field-dependent subjects' performances were influenced by visual orientation but not to the same level of performance as their counterparts. Field-independent subjects' performances on mean gain scores were facilitated highly through the use of right syntactic placement as opposed to central or left syntactic placement. This finding was in agreement with that of Frederick (1968) who found that only more analytic learners were sensitive to amounts of relevant information and with that of Salomon (1974, 1979) who observed that modeling cue attendance favored only the highly field-independent learners.

It appears possible that right compositional syntactic placement decreased abstraction time and processing effort which permitted more efficient and effective processing by both field-independent and field-dependent subjects, though field-dependent individuals may still have had greater difficulty in isolating relevant information. Perhaps other combined functional attributes were needed to provide a more powerful cue-summation effect for field-dependent learners to supplant their processing weaknesses.

In light of an aptitude interconnection or aptitude complexes explanation the findings from the two-way interaction of predictive ability and field articulation warrant consideration. While predictive ability did not interact with compositional syntactic placement as visual modeling of a mental skill (cue attendance) interacted with general ability in Salomon's (1968, 1974, 1979) studies, the resulting two-way trait interaction suggested that certain combinations of ability and field articulation may have differentially affected learner outcomes. Although the right compositional syntactic placement facilitated simple concept learning for all field-articulate learners, the two-way interaction of variables implied that a specific placement condition may provide effective compensatory supplantation for high ability, field-dependent learners. Furthermore, a different placement condition may also function to maximize the appropriate processing modes of the low ability, field-independent learners.

Limited support for this interpretation is provided further by the three-way interaction of field articulation, predictive ability, and compositional syntactic placement ($p = .10$). The utilization of syntactic

placement appeared to reduce processing and time demands which functioned to isolate, emphasize, and organize relevant information for the high ability, field-dependent learner. In fact, this orientation provided superior cue-summation for all but the low ability, field-dependent learner. Apparently, the right orientation added slightly to the processing demands of the low ability, field-dependent learner, whereas the left orientation aided this learner by isolating and directing attention to the relevant concept details. The left treatment condition was the only one in which the low ability, field-dependent subjects outperformed their high ability, field-dependent counterparts.

The general superiority for compositional syntactic placement may be taken as tentative support for Saloman's (1979) media attribute theory, where the choice of specific coding elements within a symbol system may effect the ease with which information is processed by a learner. These external stimulus cue summations may have increased both learning efficiency and effectiveness by reducing the number of possible hypotheses (Pishkin, 1965), which may have been helpful in reducing the memory demands associated with field-dependent hypothesis-testing strategies (Mayer, 1977). By providing ready-made transformations, the instructional materials may have compensated for the learner's deficiency by providing a mode of presentation that the learner could not provide (Snow, 1970). In other words, the compensatory treatments achieved for the learners what they could not do for themselves because of a particular aptitude weakness in discriminating relevant cues (Salomon, 1974).

This research has opened the door to the study of media attributes or coding systems and their relation to learner attributes. Cronbach

and Snow (1977) have suggested that the design of instruction should be selective according to aptitude. Their emphasis is directed towards the choice of appropriate instructional techniques, rather than the selection of a medium as an invariant entity. This view is particularly appropriate when considering the implications for instructional practice suggested by this study. First, the results suggest practical recommendations in terms of the specific processes reflected by field-dependent and field-independent female learners when dealing with compositional syntactic placement in kinetic media. Second, the findings support the view that the design of instruction should be selective according to aptitude because of cognitive style differences in processing information on a simple concept attainment task. Although the same compositional syntactic treatments often facilitated both field-dependent and field-independent performance, one important implication should not be overlooked. While the effective treatments permitted field-independent individuals to perform more successfully, these same treatments may have been imperative for acceptable performance by field-dependent learners who may have needed specific supplantation in order to meet a basic performance criterion.

While not a rigid test of the general hypotheses due to the specific content and type of learning designed for a specific audience, this study has indicated more research is warranted in the area of aptitude capacities of the learner and the attributes of kinetic media. In addition to compositional syntactic placement or asymmetry of the screen, Zettl (1973) has recognized other coding systems within the frame: main direction of horizontal and vertical orientations, attraction of symbol mass, figure-ground relationships, psychological closure and vectors or directional

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lines as well as movement. Kjørup (1977) and Metz (1974) have identified syntaxes beyond the level of the shot with shots forming sequences, sequences forming syntagms, and syntagms forming the whole program. The systematic study of these media attributes may establish a solid structure upon which instructional programs may be built, especially when learner traits are used in the measurement.

In regard to learner abilities, more fruitful research may result from the intercorrelational aptitude paradigm of Snow (1980). Snow has noted that fluid ability skills (G_f)--a constellation consisting of abstract and often nonverbal reasoning tests and some spatial and figural tests--should relate to learning outcomes under instructional conditions that are in some sense new, unlike those that the individual learner has faced in the past. Ability to apply learning skills crystallized previously (G_c) would not be relevant here, but ability to adapt to new kinds of learning or performance requirements (G_f) would be relevant. Snow (1980, p. 59) has predicted:

> ...that as an instructional situation involves combinations of a new technology (e.g., computerized instruction or television), new symbol systems (e.g., computer graphics or artistic expression), new content (e.g., topological mathematics or astrophysics), and/or new contexts (e.g., independent learning, collaborative teamwork in simulation games), G_f should become important and G_c less important.

Therefore, G_f tests that measure to a greater degree the kinds of assembly and control processes needed to organize on a short-term basis adaptive strategies for solving novel problems should be included in studies on interaction effects of learner and media attributes.

With the increased utilization of television and videotaped programs in education to reach new student populations, the developed learning

procedures need to acknowledge the relationship between the processing capacity of the learner and the processing demands of the media task. Consequently, educators should tailor materials to fit the aptitude predispositions of learners. In so doing, they may promote a regard for the individual that is made possible through aptitude-sensitive instruction, placing emphasis on the single most important component of an educational experience--the learner. This study has taken a preliminary step into the myrid of questions regarding the impact of media attributes on aptitude capacities of the adult learner. The results of this exploratory venture fostered more questions than answers. Nevertheless, this initial effort has served to bring into focus the important issue of learner interaction with media attributes for education.

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TABLE 1

COMPOSITIONAL SYNTACTIC PLACEMENT X ABILITY X FIELD ARTICULATION
SUMMARY OF THREE-WAY ANALYSIS OF VARIANCE

Source of Variation	SS	df	MS	F
Compositional Syntactic Placement (P)	453.99	2	227.00	19.92***
Ability (A)	.07	1	.07	.01
Field Articulation (F)	71.04	1	71.04	6.23*
P X A	4.38	2	2.19	.19
P X F	81.12	2	40.56	3.56*
A X F	111.22	1	111.22	9.76**
P X A X F	52.82	2	26.41	2.32
Error	1595.32	140	11.40	

*$p < .05$
**$p < .01$
***$p < .0001$

TABLE 2

SIMPLE MAIN EFFECTS ANALYSIS OF VARIANCE

Source of Variation	SS	df	MS	F
Compositional Syntactic Placement (P)	453.99	2	227.00	19.92
P at F_I	385.82	2	192.91	16.92**
P at F_D	184.94	2	97.47	8.11**
Ability (A)	.07	1	.07	.01
A at F_I	75.42	1	75.42	6.62*
A at F_D	40.84	1	40.84	3.58
Field Articulation (F)	71.04	1	71.04	6.23
F at A_H	3.47	1	3.47	.30
F at A_L	182.46	1	182.46	16.01**
F at P_L	2.96	1	2.96	.26
F at P_C	24.69	1	24.69	2.17
F at P_R	149.26	1	149.26	13.09**
P X A	4.38	2	2.19	.19
P X F	81.12	2	40.56	3.56
A X F	111.22	1	111.22	9.76
P X A X F	52.82	2	26.41	2.32
Error	1595.32	140	11.40	

*$p < .025$
**$p < .001$

Note. F ratios were tested at the α/q level of significance, where q equals the number of variance levels (Kirk, 1968).

TABLE 3

RESULTS OF SCHEFFE'S S METHOD OF ANALYSIS FOR COMPOSITIONAL SYNTACTIC PLACEMENT AT FIELD INDEPENDENCE

Group	Field-Independent Right	Field-Independent Left	Field-Independent Center
n	24	22	27
$\bar{X}$	8.46	4.05	3.26

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TABLE 4

RESULTS OF SCHEFFE'S S METHOD OF ANALYSIS FOR COMPOSITIONAL SYNTACTIC PLACEMENT AT FIELD DEPENDENCE

Group	Field-Dependent Right	Field-Dependent Left	Field-Dependent Center
n	26	28	25
$\bar{X}$	5.00	4.54	1.88

FIGURE 1

FIRST-ORDER INTERACTION OF VISUAL GROUPS BY FIELD ARTICULATION ON MEAN GAIN SCORES OF PREDICTIVE ABILITY

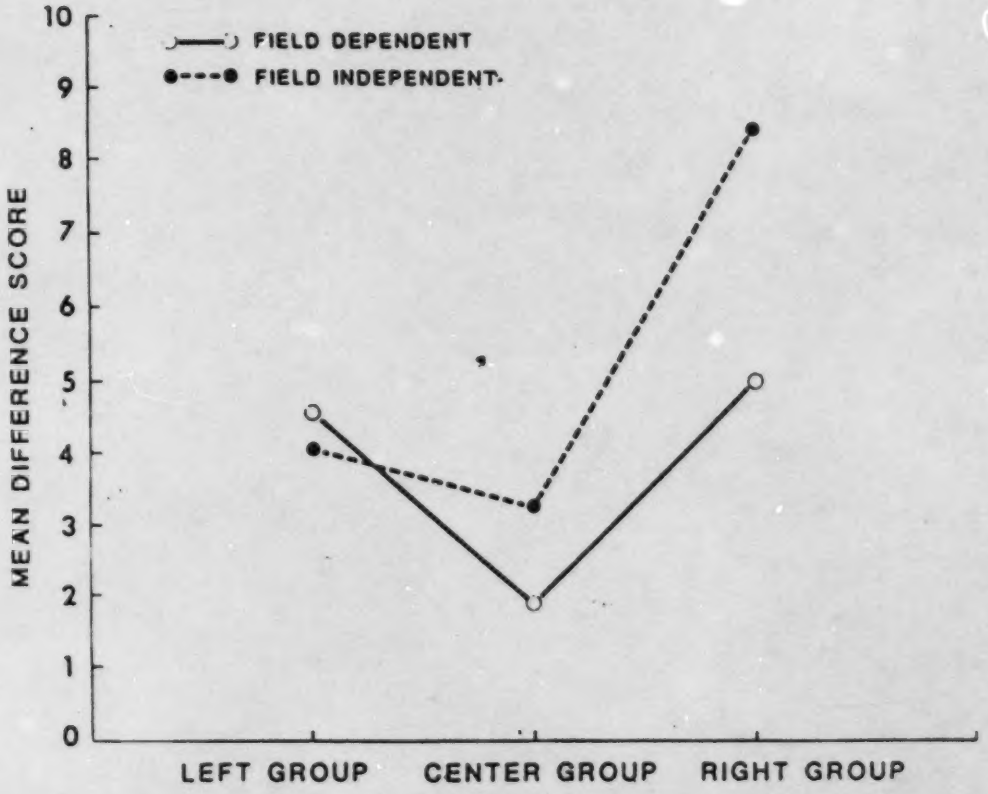

FIGURE 2

FIRST-ORDER INTERACTION OF PREDICTIVE ABILITY BY FIELD ARTICULATION ON MEAN GAIN SCORES OF VISUAL GROUPS

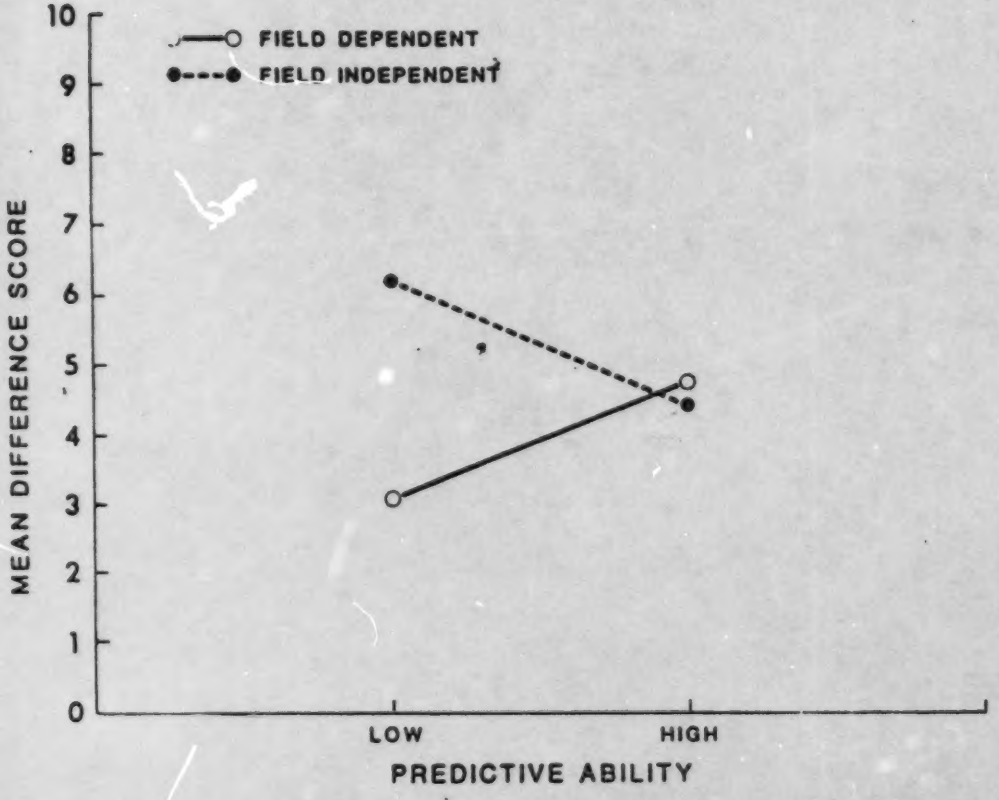

FIGURE 3

SECOND-ORDER INTERACTION OF VISUAL GROUPS BY FIELD ARTICULATION BY PREDICTIVE ABILITY ON MEAN GAIN SCORES